BAROQUE SENSATION IN MODERN DESIGN

A Senior Scholars Thesis

by

JORDAN RICHARD MASON

Submitted to the Office of Undergraduate Research
Texas A&M University
in partial fulfillment of the requirements for the designation as

UNDERGRADUATE RESEARCH SCHOLAR

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Major: Environmental Design

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Approved by:

Research Advisor: Stephen Caffey
Director for Honors and Undergraduate Research: Sumana Datta

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ABSTRACT

Baroque Sensation in Modern Design. (April 2011)

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The fundamental purpose of my research stems from the recognition of the fact that modern architectural design and architectural history have been segregated in our current educational system, and my goal is to develop a dialogue that would reunite these two fields. The reason I am looking to the past to inform the present is that so much of what has already been discovered has been lost, forgotten, or ignored, and I want to rediscover those established principles that most successfully connected the individual with the space.

It is already an established fact that various architects and designers in the past were able to capture an emotionally evocative sense of atmosphere that had this innate capacity to resonate with those who encountered those places. It has also been well established in literature that the Baroque era, dating from the late 16th to the early 18th century, qualifies as an age in which the philosophies of design and creative practice converged to produce

works that captured this aura of emotion and humanity within a space. So I am going to be narrowing my topic to focus more specifically on the Baroque era.

The research begins as an in-depth review of the relevant literature in order to establish the necessary foundation for understanding the human capacity to be affected by the environment. The first phase is an exploration into the fields of psychology and human behavior, looking specifically at what, to our knowledge, makes us feel emotion. The second phase looks into various architectural principles that relate to the first study, through the examination of spatial atmosphere, sensation, design techniques, and developmental processes that are characteristic of Baroque architecture.

Following the literature review, I propose a methodology for the recording and analysis of empirical, anecdotal evidence related to the sensory experience of space. This methodology is demonstrated through an extensive series of on-site visits to key examples of Baroque architecture in which I applied the method to collect the necessary data. Ultimately, the structure of this entire research project allows for the compilation of a template for how to incorporate, what I define as the human connection into the modern design process.

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I would like to thank Dr. Stephen Caffey for so eagerly and patiently providing his support, time, and insight into this research project, without whom this project would not have been possible. His aptitude as a mentor, enthusiasm as a professor, and commitment as a friend is unsurpassed.

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Thanks to Dr. Gabriel Esquivel for igniting my interest in sensational architecture, and for his devotion to cultivate both knowledge and competency in the field of design. His fervor and commitment to teaching is exemplary, and his friendship to me has been unwavering.

Special thanks to the College of Architecture and the Academy for the Visual and Performing Arts for providing the opportunity and financial support to make this research possible.

I would especially like to thank my fiancée, Paige, for inspiring me to pursue research, and for being a constant source of encouragement, insight, and support. Without her motivation and enthusiasm this project could not have reached its conclusion.

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CHAPTER I

INTRODUCTION

Something is missing. In the field of architecture, the focus of today's designers is continually swayed by an agglomeration of external influences, ranging from political, social, and technological to legal, economic, and competitive. Over the course of the past century, various defining movements, world wars, human expansion, and legislation has forcibly altered and diminished the role of the architect. No longer the master overseer of artistic technical creation, the architect is now merely a cog in the machine of architectural production, his ideals and responsibilities dissected and redistributed into oblivion. The result of these debilitating factors is the loss of a capacity to connect an individual to a space in a way that had only ever been explained previously as a divine encounter.

So what then is this lost trigger that plucks at the heartstrings of man's soul, binding him to his surroundings in a way that gives 'place' new depths of meaning? What was it that the architects of eras past had utilized to transport an individual to new heights of spirituality? Could it be rediscovered; reinvented? This intangible mechanism was captured and epitomized during the late 16th century to the early 18th century, the

This thesis follows the style of *Brain and Cognition*.

dynamic, evocative period of the Baroque. According to scholars, the Catholic Church enacted an initiative at the Council of Trent to promote the manipulation of religious art and architecture in such a way as to elicit among patrons a response that reverberated within the soul: Emotion (Kleiner et al., 1946).

With the Baroque discovery that an atmosphere could be created for the purpose of evoking Emotion, the utilization of the Baroque period provides an ideal platform for investigation and analysis. The purpose of my research is to enhance the human experience in the built environment by restoring intellectual discourse between the divergent fields of modern architectural design and architectural history. In order to accomplish this, it is necessary to conduct extensive research into the nuances of human emotion as well as the architectural contexts in which it was incorporated.

Throughout my academic career I have been exposed to the nature of atmosphere created by the architecture that dates not only from the Baroque, but from the very ancient up to the present day. The ability to physically approach a masterwork of architectural design, cross the threshold, transition through its evocative spaces, and to become overwhelmed by such grandeur and emotion is crucial for individuals to experience a structure as a tangible, spiritual and emotional space – an experience that simply cannot be conveyed via textbook or PowerPoint slide. For the purpose of this research project, first hand experience in architecture is essential, and in order to adequately corroborate my research, utilizing established methodologies, it becomes necessary to travel to key

locations abroad to acquire a deeper level of understanding and appreciation for the mysteries of the Baroque era.

The process of my research is to first identify the fundamental principles that were manifested by Baroque-era designers through the study of their various architectural works and then to determine how those principles and practices were combined to create various types of visual and spatial affect. This facet of my research will initially be supported by my previous research and education in the field of architectural history. The second objective is to determine whether and which of these seminal principles could be understood in a way that would allow them to be translated into modern architectural vernacular. The third phase is to explore the current literatures of environmental psychology and human behavior in order to more fully understand how subtleties of our physical surroundings elicit specific human responses. The fourth phase is to systematically study, analyze, document, and collect data from specific Baroque monuments and archives. This requires the initial development of a comprehensive methodology for recording pertinent information. The final component of my research will synthesize various combinations of the transferable philosophies with the findings of these psychological studies into a modern, architectural context that would possess the power to evoke the sensual qualities of buildings from the Baroque period.

In a world of exponentially expanding technology, globalization, and diversification, the built environment is under continual transformation; often lending itself to a process that

favors functionality over experience. In my endeavor to understand new ways to enrich the built environment, this project will hopefully add a unique depth to the abilities of designers, enabling them to create places that not only evoke emotion, but that can also become templates for deeper exploration of new Baroque realms of experiential design.

CHAPTER II

METHODOLOGY

The collection of data essential to my research is based first on the simple premise of building a foundation of knowledge through literary explorations, and then utilizing that knowledge to develop a system for analyzing and collecting data. I have divided this process into a series of detailed phases, each one illustrating a seminal component that contributes to the evolution of my research.

In the first phase of my research I focused on the accumulation of knowledge and information through literary sources. After an extensive investigation of online databases and libraries I amassed a pertinent collection of academic journals, books, and scholarly articles. The subjects of these sources ranged from Baroque art and architecture, philosophy, history, and construction, to sensory response, environmental psychology, human behavior, and neuroaesthetics.

The intention of the literary research was to first identify the fundamental principles that were manifested by Baroque-era designers through the study of their various architectural works and then to determine how those principles and practices were combined to create various types of visual and spatial affect. An ensuing objective was to determine whether and which of these seminal components could be understood in a way that would allow

them to be translated into modern architectural vernacular. By studying relevant literatures on environmental psychology and human behavior I was able to more fully understand how the subtleties of our physical surroundings elicit specific human responses, while the scientific investigations into neuroaesthetics brought to light the intricacies of aesthetic experiences at the neurological level. These explorations provided enough insight to devise an analytical process for collecting scientific data from key Baroque sites.

The methodology created for on-site analysis of key Baroque sites was developed to provide a system that would enable me to comprehensively understand and substantiate my research pertaining to each of the areas of previous literary exploration. Comprised of two main components, the system evaluates an environment from a technical standpoint and then examines human perception and sensory response.

The Technical Analysis category is devised to document, in specific detail, the following categories:

- Typical building materials
- Site plan
- Human scale
- Spatial transition
- Use of the Classical Orders
- Artistic expressions
- Architectural elements
- Surfaces
- Symbolism

The Sensory Analysis category allows for critical observation and documentation of the following:

- Visual
- Haptic
- Auditory
- Olfactory
- Orientation

The combination of this double-edged analysis allows for a comprehensive assemblage of documented information that will be used to support or disprove the theories pertaining to my research.

The final component of my research will synthesize various combinations of the transferable philosophies with the findings of these psychological studies into a modern, architectural context that would possess the power to engage the senses by evoking the sensual qualities of buildings from the Baroque period.

CHAPTER III

RESULTS

The format for my data compilation consists of two primary components. The first is a journalistic investigation into subjects selected in my literature review during the initial stages of my research. The second phase is a comprehensive summation of the data collected during my on-site investigations, outlined as a methodology describing both technical and sensory qualities of the chosen Baroque locations.

The sites selected for analysis are categorized below by country:

Italy

1. San Carlo alle Quattro Fontane, Rome
2. Santa Maria degli Angeli e dei Martiri, Rome
3. Sant'Agnese in Agone, Rome
4. Santa Maria dell'Orazione e Morte, Rome
5. Santa Maria in Campitelli, Rome
6. Il Gesù, Rome
7. Sant'Ignazio, Rome
8. Santa Maria Maddalena, Rome
9. Santa Maria del Popolo (Chigi Chapel), Rome
10. Santa Maria in Vallicella (Chiesa Nuova), Rome
11. San Giovanni dei Fiorentini, Rome
12. The Church of Sant'Andrea al Quirinale, Rome
13. Sant'Ivo alla Sapienza, Rome

Spain

14. Basilica Santa Maria del Pi, Barcelona
15. Cathedral of Barcelona, Barcelona
16. Eglesia de Betlem, Barcelona

France

17. Palais du Louvre, Paris
18. Hotel des Invalides, Paris
19. Hotel de Soubise, Paris

20. Institute de France, Paris
21. Church of the Val-de-Grace, Paris
22. Palace of Versailles, Versailles

Czech Republic

23. The Loreta, Prague
24. St. Nicholas Church, Old Town, Prague
25. Prague Castle, Prague
26. St. James Church, Prague
27. St. Nicolas Cathedral, Prague
28. Sternberg Palace, Prague
29. Strahov Library, Prague

Mexico

30. Catedral Metropolitana, Mexico City
31. Chapel of the Church of Santo Domingo
32. Cathedral Bailica of Puebla de Los Angeles, Puebla
33. Santa Maria Tonoantzintla, Puebla

Literature review

Baroque architectural history

In order to effectively understand the fundamentals of Baroque architecture, an investigation of key architectural sites is necessary. John Varriano, a professor at Mount Holyoke College, in Massachusetts, teaching art and architectural history of seventeenth century Rome, has published over three-dozen books on his field of expertise. His book, *Italian Baroque and Rococo Architecture,* is the first comprehensive study of this subject to be completed in English and illustrates the broad range of places within Italy that exemplify the principles and ideologies of the Baroque era. Considering that Italy is the primary source for the development of Baroque architecture, Varriano's concordance,

descriptions and illustrations are essential, not only to gain a deeper understanding of the origin of the movement, but also to provide a starting point for the selection of Baroque sites to study (Varriano, 1986).

Heinrich Wölfflin, a renowned Swiss art critic and author penned *Renaissance and Baroque* in 1888, and marked a turning point in the negative public perception of the Baroque era. He was able to make a clear distinction between the Renaissance and Baroque periods, stating that, unlike its predecessor, the Baroque could be expressed as "movement imported into mass." Wölfflin's writing introduced the validity of the Baroque as an authentic period in history, bringing new means of critical analysis and terminologies to describe the complex nature of the newly defined age (Wölfflin, 1964).

Sensory response

Current explorations into the fields of atmosphere and sensation have been extensively researched by scholars such as Juhani Pallasmaa. An architect and former Director of the Museum of Finnish Architecture, Pallasmaa used his life experience and research to develop his own dialogue through the unification of two main essays. The first essay explains the propensity of our current culture to over-privilege the visual sense above all others, and how this tendency has evolved since its inception in Greek culture. The second essay speaks to a more sensory-inclusive potential within architecture, illustrating various sources that exemplify an elicited sensory response, such as the haptic quality of Corbusier's designs, or the acoustic attributes of Gehry's Music Halls. Pallasmaa's

analysis provides architects and students with a format for integrating sensation into the design process with the intention of producing a fully immersive, sensory experience (Pallasmaa, 2005).

Referring to the role of the senses in Baroque architecture specifically, James Pierce has elaborated on the importance of sensory inclusion within an architectural space. His research effectively illustrated the intrinsic link that exists in Baroque architecture between the visual and auditory elements. In his writing, he discusses how many structures were designed not only to promote a rich, acoustic atmosphere, but how the design decisions reflect a visual manifestation of period music (antiphonal music surrounded the audience and directed the focus back and forth and side to side, in the same style that the Chigi Chapel was manipulated by Bernini to guide the viewer's attention in a specific way). The integration of visual representations of sound is one example of a multi-sensory atmosphere, even though the experience appears to be primarily visual (Pierce, 1959).

Authors Joy Monice Malnar and Frank Vodvarka, professors at University of Illinois, Urbana-Champaign and the Loyola University Chicago respectively, combined the results of their research to illustrate the potential to enhance the human experience in design. They enriched their studies by acquiring a broader understanding of relevant fields such as anthropology, psychology, and architectural theory, ultimately developing

a more effective typology for calculating the nature of the human response to specific environments. The book extends further into the realms of virtual reality and how these same human responses can be calculated within fully immersive digital environments (Malnar, 2004).

Juliana Neves is an employee of Kube Arquitetura, an architectural research lab based in Rio de Janeiro Area, Brazil. Neves' research is primarily based on the potential of architecture to elevate the importance of the human senses other than visual, ultimately to elicit a stronger, emotional response within a building. The modern examples she used to illustrate her research were the Blur Building in Switzerland and the Jewish Museum in Berlin. Both sites strive to increase the inclusion of the primary senses, each producing a very different series of emotional responses. These findings illustrate the current potential through modern construction and technologies to design for all of the senses (Neves and Damazio 2010).

Environmental psychology and human behavior

Since 1979, Paul A. Bell has taught psychology as a professor at Colorado State University, and has published five editions of his exhaustive research compilations in *Environmental Psychology*. In the text, he explains how humans have the capacity to be affected by a wide variety of environmental factors, ranging from noise and light to weather and orientation. According to Bell, we also have the potential to modify the

environment in a highly refined way so as to generate specific psychological responses through design principles such as aesthetics. He also addresses what beneficial or hazardous effects these manipulations may have on our ecological system, both short and long term. The arguments conveyed in this book not only provide a fundamental a clearer understanding of the various influential factors within the built and natural environments, but illustrate the established mechanisms for measuring those factors and their subsequent responses (Bell et al., 2000).

Edward O. Wilson is a two-time Pulitzer prize winner, and a professor at Pellegrino University focused on Entomology for the Department of Organismic and Evolutionary Biology at Harvard University and is also a Humanist Laureate of the International Academy of Humanism. He coined the term Biophilia in 1984, initiating a massive scientific exploration into man's intricate relationship with nature. Out of the evolution of the study, he devised a series of tools to explain, categorize and measure human psychological and physiological responses to various stimuli, whether they are instinctively formidable or appealing, such snakes versus kittens, or a scene from nature versus a cityscape. The results of Wilson's hypothesis would provide a refined, scientific framework by which more accurate measurements of the human connection to a specific environment can be ascertained (Wilson, 1999).

Peter Zumthor, a Swiss architect, established himself as a leading practitioner in the field of design from his small studio in Haldenstein, Switzerland, and gained international acclaim in 2009 when he was awarded a Pritzker prize. Besides teaching at schools across the United States and Europe, his studies focus on the necessity of incorporating specific phenomenological elements so as to promote an unconscious relationship with a place. In his book, he illustrates the parallels between the houses he designs and his favorite music, literature, and any element in life that inspires him. His intellectual process provides a more in-depth look into the decision making process of modern design that is ultimately intended to produce a memorable, atmospheric space (Zumthor, 2006).

Paul Silvia is a professor in the department of psychology at the University of North Carolina at Greensboro and is the author of over a dozen scholarly publications. His article on emotional response was a reexamination of Daniel Berlyne's psychobiological model from the 1970's, and discussed the benefits and limitations of Berlyne's studies. Silvia concluded that appraisal theories of emotion inform the study of aesthetics and according to him, "make new predictions about emotional responses to art, expand the domain of aesthetic emotions beyond positive emotions such as interest and enjoyment, inform other theories… and reinterpret past findings." The benefit of Belryne's findings to my research further expands and validates my understanding of emotional response to aesthetic stimuli (Silvia, 2005).

Neuroaesthetics

The literary component of this research project culminates in an analysis of a new, cutting-edge field: neuroaesthetics. Scholars of this topic, Kirk Ulrich and his fellow research collaborators, are currently involved in various departments at the Copenhagen University Hospital, University College London, The Panum Institute in Copenhagen, and the Aarhus School of Architecture in Denmark, with respective expertise in the fields of Magnetic Resonance Imaging, Exercise, Neurobiology and Architecture. The purpose of their research was to illuminate the areas of the brain that become activated due to an emotional response to specific architectural environments, and to determine if specific judgments on aesthetics are only determined by expertise. Ultimately, their study demonstrated that familiarity or education does not have an overwhelming influence on aesthetic appeal, unlike the synaptic responses at the neurological level, which showed that more areas of the brain were activated in individuals with an architectural background. For designers, this means that an architectural education is not essential for the general public to have a similar response to the aesthetic and emotive elements integrated into a space (Kirk et al., 2008).

The three authors of this journal publication are members of Geneva Emotion Research Group, within the department of psychology, at the University of Geneva, Switzerland. Utilizing a Component Process Model (CPM), which is an appraisal-based emotion theory, they are effectively able to model emotion elicitation and differentiation without employing traditional methods that measure facial and vocal expression. The end result

of this study demonstrates the latest capabilities to differentiate between specific emotions by observing activity at the base neuron level, ultimately allowing scientists the means to accurately gauge emotion with a high degree of specificity (Sander et al., 2005).

Technical analysis

The most visually descriptive of these ten categories is supported by a series of visual, photographic references, taken from specific sites that best illustrate the physical contexts that epitomize Baroque atmosphere.

Materials (see accompanying photographs in APPENDIX B*)*

The first category, Materials, consists of nine (9) subcategories that together encompass the primary building components of a Baroque structure. The materials recorded include Marble, Coarse Stone, Wood, Plaster/Stucco, Metalwork, Gilded Surfaces, Paint, Fabric/Tapestry, and Glass. The various material elements are illustrated through a photo journalistic montage of Baroque sites in Italy, Spain, France, the Czech Republic, and Mexico.

Plans (see accompanying photographs in APPENDIX C*)*

The second category, Plans, conveys the intent of the architect at ground level. By examining plans, the arrangement and density of positive and negative spaces is comprehensible, thus displaying the underlying framework for the production of an atmosphere.

Human scale

An analysis of the human proportion in a space underlines the role of humans within surrounding context, further providing a basis for an emotional response. Upon investigating the selected Baroque locations, it was apparent that human scale was explored in a wide range of contexts, for varying purposes. In spaces such as the Catedral Metropolitana, in Mexico City, all of the components of the church were constructed at a monolithic scale, evoking a stronger sense of personal insignificance. In contrast, with the church of Santa Maria dell'Orazione e Morte, in Rome, the designers decided to construct a far more intimate space where all of the elements are compatibly scaled to human proportion, ultimately minimizing the atmospheric barrier between the individual an the church. Other spaces, such as St. Nicolas Cathedral, in Prague, exhibit multiple spaces at varying scales, offering a multifaceted experience from inside the church walls.

Transition

The provision, or lack, of intermediate space between the public street and the main space within a building can have an impact on a human’s psychological and emotional

response. Many small buildings, such as San Carlo alle Quattro Fontane, in Rome, have little or no transition from the public sector, immediately transporting an individual from the busy street into the midst of the serene atmosphere. Other spaces, such as the Palais du Louvre, in Paris, possess a far more elaborate series of transitionary spaces, gradually drawing visitors into the complex.

Classical orders

The art of incorporating precedent by exhibiting an established architectural vernacular has multiple uses. These orders include Tuscan, Doric, Ionic, Corinthian and Composite, and elements define them can be as broad as pediments, entablatures, and columns, or as detailed as egg-and-Dart motifs, scrollwork, and Doric gutta. While introducing a variety of new, often controversial ideas, Baroque architects simultaneously grounded their innovations in the Classical orders and then challenged their authority through fanciful manipulation, demonstrating a new level of authority and power. Many Baroque structures, such as Sant'Agnese in Agone, in Rome, adhere to the revered utilization of these orders, while others, such as the Loreta, in Prague illustrate very little restraint with the intense distortion of Classical Orders and Elements.

Artistic expressions

Critical to the characterization and development of the Baroque was the fusion of the arts and architecture. Baroque architects across the globe practiced a variety of techniques for how to interweave painting, sculpture, metalwork, woodwork, stonework, architecture and even music into an atmospheric masterpiece that was not only directed by personal taste, but was the most obvious reflection of the culture of origin. In Rome, there is no finer example of this than the ceiling of Il Gesu, an unparalleled masterpiece due to its integration of a gilded architectural framework, "flying" marble sculpture, and a painting so dynamic that it refuses to be constrained by traditional barriers, its figures literally spilling out onto the building's interior surfaces, but focused in a direction that ultimately points to the Greek name of Jesus, ablaze at the ceiling's zenith.

Architectural elements

In order to recognize the various components of a building and accurately record this data, a working dictionary of common architectural elements had to be defined. See Appendix A for the catalog of basic or common architectural elements and their respective definitions.

Surfaces (see accompanying photographs in APPENDIX D*)*

Through the manipulation of materials, Baroque architects and artisans produced a nearly endless array of surfaces. Broken down into manageable categories, the surfaces typically

can be identified as Smooth, Coarse, Organic, Geometric or a combination of these qualities.

Symbolism

Fundamental to the enrichment of a Baroque space is the integration of symbolism. In Baroque churches, symbolism is primarily religious, with occasional secular overtones. The most common subjects represented through religious depiction or symbolism in a Baroque context include God the Father, the Son, the Holy Spirit, Angels, Cherubim, Demons, Satan, Heaven, Hell, Salvation and the Final Judgment. A site that incorporates most, if not all, of these symbols is the Church of the Val-de-Grace, in Paris.

The subjects of Secular symbolism or portrayal primarily include pagan (mythological) and political figures or entities. An example of this integration is the Palace of Versailles, where Greek and Roman deities such as Artemis, Mars, Poseidon and Apollo are portrayed throughout the palace in sculpture and painting. Lining the halls and chambers of the palace are various marble busts of such figures as Voltaire, Emperor Vespasian, Louis XVI, and Marie Antoinette.

Sensory analysis

The second component of my methodology, Sensory Analysis, was implemented to record how a Baroque atmosphere stimulates five senses. The senses selected for this study are Visual, Haptic, Auditory, Olfactory and Orientation. Upon entering each space, attention was given to the activation of these senses and recorded accordingly. Below is a compilation of select sensory response data recorded while investigating select Baroque sites. Having studied a large number of the sites across Europe and Mexico, similarities began to materialize, and thus these journalistic entries effectively describe many Baroque locations, regardless of culture or location.

Visual

- Layers of intricate surface manipulation, saturation of multifaceted "textures" break down the definition of form, both physically and perceptively as light hits surfaces (form begins to dissolve in light)
- Subtle quantity of light accentuates smooth, ornate and geometric surfaces.
- Natural light in the cupola, artificial light at ground level.
- Geometric pattern on floor correlates to geometry of ceiling.
- Light at the altar produces varying shadow lengths along the curving interior columns and surface extrusions.
- Massive space with limited light sources producing clear juxtaposition of light and shadow.
- Interior is brightly colored with visually complex, ornate surfaces.
- Colorful, painted stonework.
- Light fills the interior, accentuating subtle, linear surface extrusions and outlines.
- Colorful paintings above, framed in gold, intensify the contrast between painting and the stone.
- Decorative integration of white marble and gold.
- The forms of the fluted columns and pilasters are enhanced by light and shadow.
- Hidden light sources illuminate sculptures.

- Light from clerestory in cupola creates floating illusion.
- Geometric pattern on the floor "organizes" interior.
- Series of vertical "breaks" enhances the perception of vertical hierarchy.
- Overwhelming sense of music through sinusoidal inundation; form seemingly influenced by "sound waves" emanating from the organ.
- Dimly lit interior, few fenestrations. Small lantern in the cupola is the primary light source and seems disconnected from structure.
- Dimly lit interior, high contrast between light vs. shadow.
- Few light sources, almost hidden. Visual/haptic relationship notable.

Haptic

- Cold, "earthy" surfaces (stone) primarily at ground level.
- Fluted columns and pilasters enhance the tangibility at ground level.
- Upon ascension, textures seemingly dissolve, subconsciously increasing the distance from the ground the ceiling.
- Wide variety of textural qualities. Ceiling has a grid surface extrusion pattern, floral surface highlights, smooth marble columns.
- Integration of marble, plaster, wood, gilding and some metal work enriches haptic experience.
- Intangible surface textures in the cupola.
- Mostly marble and granite interior. More variety of "earthy" textures.
- Chapels have rich textural variance. Gilded floral framing and coffering, marble frames for paintings. In place of some paintings: High relief, marble sculpture "scenes."
- High altar echoes intensity of chapels. Central, receded image radiates light and gilded rays, cherubim, and cloud in all directions.

Auditory

- Curving walls reverberate sound while surface details dampen sound.
- Echoes of Gregorian chants carry and reverberate throughout space.
- Acoustics overlap. Simple space complementary for simple sound/sound waves.
- The combination of the dome, half domes, and barrel vaults cause voices to reverberate and echo intermittently within the space.
- Small, intimate space clarifies sound. Surface extrusions dampen noise.

- Sharper echoes, possibly due to simplistic surfaces and overall plan and elevations.
- High altar has explosive visual/acoustic intensity.

Olfactory

- With vision removed, the senses indicated small, damp space.
- Smokey musk of burning candles.
- Scent of rain outside permeates to the interior.
- Space so vast that a new atmosphere is created.
- Incense burning.
- Scent and taste of rain.
- Musty scent of aged wood.
- Visual influence on olfactory senses.
- "Clean" taste/smell due to the visual influence of pristine elements.

Orientation

- Orientation somewhat inhibited due to curving interior. (Eyes never stop moving along topographic surface)
- Symmetry of interior provides legibility.
- Legibility through clear geometries, both horizontally and vertically.
- Legible orientation. Subtle surface nuances do not inhibit the legibility of overall form, plan, elevation…
- Symmetry aids in legibility despite subtly curving interior.
- Entrance is not from the front, but offset from center, initially inhibiting orientation.
- Explosive intensity of high altar and neutral background draws primary focus and providing direction and enabling legible orientation.

CHAPTER IV

SUMMARY AND CONCLUSIONS

The purpose of my research is to enhance the human experience in the built environment by restoring intellectual discourse between the divergent fields of modern architectural design and architectural history. So how can all of the information discussed in the previous chapters converge to produce a framework that can effectively be utilized by today's designers? What can architectural history offer to the contemporary architect seeking to create not just a building, but an experience?

In the Literature Review, four fundamental areas were investigated: Architectural History, Environmental Psychology, Sensory Perception and Neuroaestheics. I will discuss key findings from each of these categories, how these specific findings contribute to my research, and how they either support or negate my hypotheses. Following this discussion, I will briefly summarize the findings of my data collection, and how this information builds upon my literary study, ultimately leading to my conclusions.

Literature review conclusions

Illuminating principles of architectural history

The idea to investigate the relevancy of architectural history in the context of modern design began simply with the theory that architectural principles that had been discovered and established in previous centuries might still be relevant and influential in the world of design today. My literary investigation into the history of architecture unveiled a number of pertinent truths, namely; the classification of the Baroque period as emotional, Baroque innovation, and the cultural interpretation and evolution of the Baroque.

As John Varriano states, "Baroque architects believed that the most powerful and energetic works of art induce strong passions capable of transporting one's soul into a higher realm. If Renaissance architecture was to be contemplated on an intellectual level, Baroque architecture was to be experienced with the emotions and the senses" (Varriano, 5). No longer confined by the sober regularity of the past, Baroque architects opened the floodgates of experimentation, seeking to fashion an atmosphere defined by emotion.

Based on the written works by such scholars as Wodehouse et al. (2007) and Wölfflin (1964), I learned that leading Baroque architects, such as Francesco Borromini and Gianlorenzo Bernini, relied heavily on innovation and creativity, their intentions imbued

with the desire to draw individuals into a state of spiritual wonderment. A brief selection of these design decisions include the following concepts: constructing a façade that is seemingly set in motion by an invisible, undulating force; dynamic integration of painting, sculpture, and architecture; overall fluidity of form; ornate surface manipulation; the capture of immediacy and intensity through artistic expression; concealment, refraction, and reflection of light; textural variance; and the manipulation of the Classical orders.

The interpretation of the Baroque across various geographic regions illustrates not only a cultural influence that further complicates the definition of the movement, but also conveys an evolution of the Baroque sensibilities themselves. As Lemerle explains, "there are patent disparities in terms of chronological milestones and stylistics between Italy and Spain, or between France and Germany" (Lemerle, 7). The oscillating exterior of Rome's San Carlo alle Quattro Fontane stands in stark contrast to the rigid formality expressed in the façade of the Palace of Versailles, and from an artistic vantage point, the vibrant paintings of Peter Paul Rubens convey Flemish overtones, while Alonzo Cano's Spanish background is realized in his Inmaculada del Facistol in Granada Cathedral.

Investigative findings from environmental psychology

Leaping ahead to the 20th century, Environmental Psychology became a point of interest for scholars and architects alike as new discoveries communicated ideas about human behavior, environmental manipulation, and man's relationship to nature.

Understanding the psychological influences on human behavior and how individuals typically respond to a specific external force is a valuable tool in the hands of an architect. Both scholars and designers alike now recognize the potential to influence the state of mind through manipulation of built surroundings. When seeking to influence the buying behavior of customers, department stores effectively illustrate this concept by adjusting color, lighting, sound, textures, furnishings, etc. When discussing the effects of light and lighting on behavior, Bell discusses how the "two commonly held beliefs are that low levels of light lead to both greater intimacy and to quieter or reduced conversation… Several studies support these beliefs. For example… Gergen, Gergen, and Barton (1973) reported that when college students who were strangers were placed in a dark room for several hours, considerable verbal and physical intimacy occurred between them" (Bell, 387). It is apparent that Baroque architects were also aware of the affects of the surrounding environment on behavior, as Baroque churches themselves possessed the remarkable capacity to elicit a response that elevated mind and soul, deriving from patrons awe, reverence and meditation.

In 1984, Edward Wilson coined the term Biophilia, in reference to "the innately emotional affiliation of human beings to other living organisms" (Wilson, 31). Both the scholars of today and the architects of the past recognized the essential connection of nature to humanity. The Baroque period was exceptionally defined by an active attempt to capture and emulate nature to that same affect, both figuratively and metaphorically. The Baroque architects were masters in the manipulation of light, materials, space, symbolism, music, art and architecture, combining and intertwining these elements into an elaborate composition; a prismatic refraction of nature itself. As Wilson describes, "The human need for nature is linked not just to the material exploitation of the environment but also to the influence of the natural world on our emotional, cognitive, aesthetic, and even spiritual development" (Wilson, 42).

Validity of sensory response

Complimentary to these psychological and physiological explorations is the field of Sensory Response. The literature studies that I conducted for this field illuminated such transformative concepts as sensory deprivation and cognitive-sensory relationships.

As described by Pallasmaa in his book, *The Eyes of the Skin*, "the dominance of vision over the other senses – and the consequent bias in cognition – has been observed by many philosophers. A collection of philosophical essays entitled *Modernity and the Hegemony of Vision* argues that 'beginning with the ancient of Greeks, Western culture has been

dominated by an ocularcentric paradigm, a vision-generated, vision-centred interpretation of knowledge, truth, and reality'" (Pallasmaa, 16).

Juliana Neves further elaborated on this idea of sensory exaltation and deprivation. "According to neurologist Antonio Damasio, bodily senses give rise to emotions, which in turn provide the basis for rational thought. Based on Damasio's thesis on emotion and its relationships to human activity, we can conclude that our emotional responses to the designed environment are directly related to our senses. Therefore, if designers are to understand people's emotional responses to products and to develop an emotion-focused design process, we need to expand our understanding from vision to the other senses" (Neves and Damazio 2010).

According to Pallasmaa, Sensory Response is proportional to perception: the more active the participation of all the senses, the more accurate the perception of reality. The result of this ocularcentric phenomenon has been the demotion of the other senses, ultimately producing a reality void of complete, vivid perception. It is apparent that in order to recapture the sensorially immersive atmosphere of the Baroque, the ability to design an environment based not only on aesthetic appeal, but also on the activation of each human sense, is a progression towards the generation of an emotionally charged, fully perceptive experience in architecture.

Upon further exploration into the literature discussing the relationships between emotion, cognition, and the senses, Joy Malnar brings the discussion down to a neurological level in *Sensory Design*. Speaking specifically of the olfactory sense, "it has many connections… with older brain structures that regulate emotions and motivation, including the limbic system, the brain stem, and the pituitary gland (through which smell influences bodily function via hormone production). Thus 'we do not in the first instance rationalize and verbalize what we smell, but have an immediate *reaction* to a smell and a tendency to act in accordance with it. In other words… smelling something generally leads to emotionally colored and sometimes even instinctive actions'" (Malnar, 132). This information demonstrates the connection of the senses to emotion and cognition, and validates the practice of sensory inclusion in design for the purpose of eliciting an emotional response.

Neuroaesthetic potential

At the cutting edge of the explorations into perception, emotion, and the built environment is the field of Neuroaesthetics. Defined by scholars as the "scientific study of the neural bases for the contemplation and creation of a work of art" (Nalbantian 2008), this discipline strives to connect comprehension and aesthetic response by illuminating and recording activity in the human brain via cognitive mapping. The study executed by Kirk and his associates, and detailed in the article, *Brain Correlates of Aesthetic Expertise: A Parametric fMRI Study*, demonstrates this new wave of innovation in understanding the root causes and responses of aesthetics that occur at the neurological

level. Kirk's team illustrated scientific evidence demonstrating that experience and education in the area of aesthetic appeal is actually not essential to reach a specific aesthetic response. The aesthetic responses of a mind educated in the fields of art and architecture and one that is not are only apparent in the cognitive processes and not in the outward, conclusive decisions. This model underlines a necessity to incorporate and emphasize scientifically derived information about aesthetic appeal and response in the design process.

Data collection conclusions

Through the collection and compilation of data derived through the utilization of my established methodology, I made a number of discoveries and observations that validate, negate, or build upon the literature explorations.

Cultural influences

One of the most defining qualities that characterized each of the sites that I visited in Europe and Mexico was the cultural interpretation of the Baroque sensibility. Having originated in Italy, I began my study in Rome, familiarizing myself with the style and character of Roman Baroque. What I came to realize is that geographic distance actually had an affect on the development of the Baroque elements. While Rome and the locations

immediately surrounding Italy practiced restraint in the utilization of the established principles, distant cultures were increasingly liberal in the interpretation of this form of design. For example, cathedrals in Mexico and the Czech Republic, both more geographically distant from Italy, manipulate surfaces to such an extent that upon entering, form and clarity almost disintegrate due to the intense saturation of applied texture and detail. In some instances, the architectural elements themselves, such as columns, capitals, pediments, etc. are excessively warped, duplicated, stacked, and exploded almost to the point of obscurity.

The spiritual mechanism

One of the most illuminating discoveries made during the course of my research took place during the final completion of the data collection phase, having already investigated each of my selected Baroque locations. The discovery was a physical manifestation of a concept; evidence of a declaration by the Catholic Church during the counter-reformation hundreds of years before. At that time, the church had expounded on a need to incorporate the act of procession within the church walls. This decree had most obviously been realized with the introduction of a nave and the overall elongation of the building's plan, forcing patrons to progress from the entrance down the central hall to the opposite end. However, after reviewing the compiled data that I had assembled, I realized that there was another incentive for procession at work; a motivation woven into the fabric of the physical building. The impetus was a progression based in Emotion.

The process begins at the church entrance with the senses in a state of placidity, ready to be awakened. Journeying deeper into the church, the senses become increasingly activated, the reality of the atmosphere gradually becoming more accurately and comprehensively perceived over time. Upon reaching the point in time and space where the nave terminates, the senses are rapidly firing at the synaptic level. Positioned at the center of the transept crossing, set in full glory beneath a heavenly dome stands the High Altar. Not only the zenith of symbolism within church, the altar in Baroque churches is also the singular location for the ultimate, sensorially explicit experience.

The High Altar, the place that is most revered; most sacred. The spiritual/physical location where heaven and earth, divine and the mortal, God and man are connected. What I witnessed was a system implemented by the original architects designed to subconsciously heighten the emotional and spiritual states, ultimately culminating in a state spiritual ecstasy upon arrival at the High Altar. The mechanism to enact this response was a deliberate attempt by the designers to connect with the faithful through Sensation.

Visually, the High Altar is always illuminated by the majority of natural and artificial light, and due to the nature of the materials is quite often highly reflective. From a haptic perspective, the High Altar always displays the most heavily saturated surface manipulation in the church, incorporating gilded ornamentation, nuanced linework, and

textural variance. Activating the auditory sense, the High Altar is almost always positioned opposite the main source of music, and is also located directly beneath the dome, where sounds and voices reverberate clearest. Linking taste and smell, the olfactory sense is stimulated at the High Altar as the scent of burning incense and prayer candles that adorn its structure fill the air. Enhancing the realization of an individual's embodiment in the space, the sense of orientation is actuated as the High Altar's position on the central axis aides in overall balance and spatial legibility. In addition, figures and symbolism on the High Altar are also scaled down to human proportions, subliminally relating the individual to the entirety of the space.

Summation

There are many elements at work that contribute to an emotional response in a space, and these influential factors can be derived from a variety of external sources, ranging from memories and acquired knowledge to biased preconceptions and symbolic associations. This study does not seek to comprehensively explain all potential sources of emotional response in an architectural atmosphere. Instead, the emphasis of this research is primarily to rediscover forgotten principles practiced by architects of the past, ultimately to develop a dialogue among designers expressing the validity of architectural history as an investigative step in the modern design process.

Based on the findings of my literature review and the experiential observations of my data collection, one of the most outstanding, and overlooked, mechanisms for incorporating emotion into the design of architecture, and the facet of my research that eventually became a primarily focus, is found in the study of sensation. It is through the senses that reality is perceived, and what I found was that the more inclusive the perception, the stronger the attachment to place, the more vivid the development of memory, and the greater the potential for an emotional and spiritual experience.

Due to the ease at which information can be accessed and learned, designers of today possess an amazing potential to revive the role of the architect. By demonstrating a knowledge base that is rooted in historic principles, modern practices, and the leading advances in innovative design, architects can recapture the forgone capacity to connect an individual to a space, an endeavor that could redefine not only the role of the architect, but the meaning of modern architectural design.

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APPENDIX A

ARCHITECTURAL ELEMENTS DICTIONARY

Abacus - a flat slab forming the uppermost member or division of the capital of a column, above the bell. Its chief function is to provide a large supporting surface (wider than the capital) to receive the weight of the arch or the architrave above.

Acanthus Leaf - Motif in classical architecture found on Corinthian columns.

Apse - vaulted semicircular or polygonal end of a chancel or chapel.

Arch - a curved structure capable of spanning a space while supporting significant weight.

Architrave - formalized lintel, the lowest member of the classical entablature. Also the moulded frame of a door or window (often borrowing the profile of a classical architrave).

Balustrade - Railing at a stairway, porch or roof.

Barrel Vault - an architectural element formed by the extrusion of a single curve (or pair of curves, in the case of a pointed barrel vault) along a given distance.

Bas Relief - Shallow carving of figures and landscapes.

Bays - internal compartments of a building; each divided from the other by subtle means such as the boundaries implied by divisions marked in the side walls (columns, pilasters, etc.) or the ceiling (beams, etc.). Also external divisions of a building by fenestration (windows).

Capital - forms the crowning member of a column or a pilaster. The capital projects on each side as it rises, to support the abacus and unite the form of the latter (normally square) with the circular shaft of the column.

Clerestory - an upper level church, the walls of which rise above the rooflines of the lower aisles and are pierced with windows.

Coffer - a sunken panel in the shape of a square, rectangle, or octagon that serves as a decorative device, usually in a ceiling or vault. Also called caissons, or lacunar.

Columns - a vertical structural element that transmits, through compression, the weight of the structure above to other structural elements below.

Cornice - upper section of an entablature, a projecting shelf along the top of a wall often supported by brackets.

Cupola - Projection from top of roof.

Dentil - Molding made up of rows of small square blocks.

Dome - a structural element that resembles the hollow upper half of a sphere.

Drum - the upright part of a building on which a dome is raised. It is generally in the shape of a cylinder.

Egg & Dart Motif - Molding in which an egg shape alternates with a dart shape.

Elevation - a drawing defined as a horizontal orthographic projection of a building on to a vertical plane, the vertical plane normally being parallel to one side of the building; the most common view used to describe the external appearance of a building, being a view of (or simply a synonym for) a façade.

Engaged Column - a column embedded in a wall and partly projecting from the surface of the wall.

Entablature - Horizontal detailing above a classical column and below a pediment, consisting of cornice, frieze and architrave.

Façade - one side of the exterior of a building, especially the front, but also sometimes the sides or rear.

Fluting - narrow vertical grooves on shafts of columns and pilasters.

Frieze – a band (often decorative) below cornice.

Gutta – small water-repelling, cone-shaped projection used in the architrave of the Doric order.

Molding - decorative finishing strip.

Nave - the central approach to the high altar, the main body of the church.

Pediments - in classic architecture, the triangular-shaped portion of the wall above the cornice which formed the termination of the roof behind it. The projecting mouldings of the cornice which surround it enclose the tympanum, which is sometimes decorated with sculpture.

Pendentive - a constructive device permitting the placing of a circular dome over a square room or an elliptical dome over a rectangular room.

Piers - an upright support for a superstructure, such as an arch. Sections of wall between openings function as piers.

Pilasters - a slightly-projecting column built into or applied to the face of a wall. Most commonly flattened or rectangular in form, pilasters can also take a half-round form or the shape of any type of column.

Rusticated - Stonework with beveled or angled edges.

Scroll - an element of ornamentation using a spiral. The name comes from by the supposed resemblance to the edge-on view of a rolled parchment scroll.

Side chapel - a chapel within a cathedral or larger church building.

Sunburst - a design or figure commonly used in architectural ornaments and design patterns.

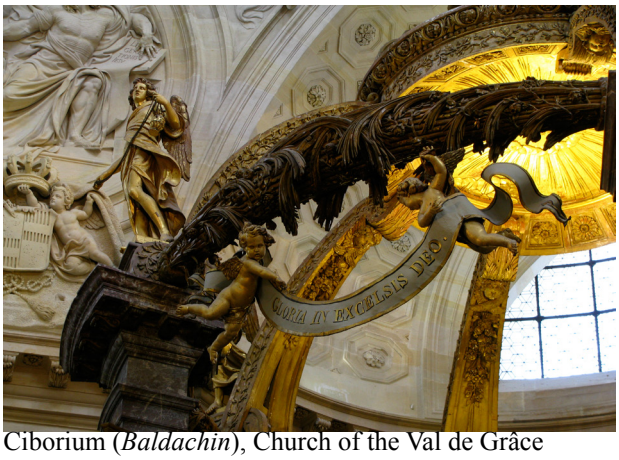
Transept - the area set crosswise to the nave in a cruciform ("cross-shaped") building in Christian church architecture.

Vault - an arched form used to provide a space with a ceiling or roof.

Volute - a spiral scroll-like ornament that forms the basis of the Ionic order, found in the capital of the Ionic column.

APPENDIX B

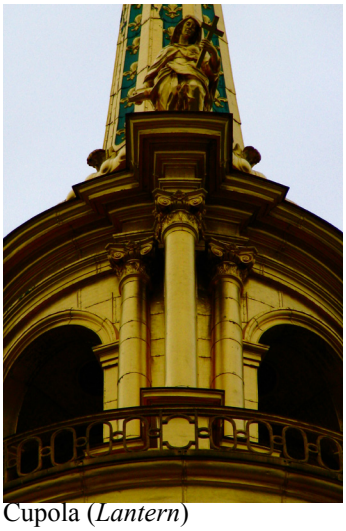
Metalwork Illustrations



Ciborium (*Baldachin*), Church of the Val de Grâce
Paris, France

Composite Capital, L'Hôtel National des Invalides
Paris, France

Ciborium (*Baldachin*)
Church of the Val de Grâce
Paris, France



Cupola (*Lantern*)
L'Hôtel National des Invalides
Paris, France

Royal Stair
Palais du Louvre
Paris, France

Wall Sconce
Hôtel de Soubise
Paris, France

Golden Gates
Palace of Versailles
Île-de-France, France

High Altar
Church of the Val de Grâce
Île-de-France, France

Metalwork Illustrations

Bronze Angel
Church of the Gesu
Rome, Italy

Entablature Support
Santa Maria della Vittoria
Rome, Italy

High Altar Sunburst
Santa Maria della Vittoria
Rome, Italy

Door Way Tracery
San Carlo alle Quattro Fontane, Rome, Italy

Tomb of John of Nepomuk
St. Vitus Cathedral
Prague, Czech Republic

Arch Detail
L'Hôtel National des Invalides
Paris, France

Ciborium Chapel Altar Detail
St. Nicolas Cathedral
Prague, Czech Republic

Organ Detail
St. Nicolas Cathedral
Prague, Czech Republic

Pilaster Detail
The Loreta
Prague, Czech Republic

Paint Illustrations

Triumph of the Name of Jesus, Ceiling of Church of the Gesu Rome, Italy

Royal Ceiling Detail, Palais du Louvre France

Side Chapel Painting, Santa Maria dell'Orazione e Morte, Rome, Italy

Paint Illustrations

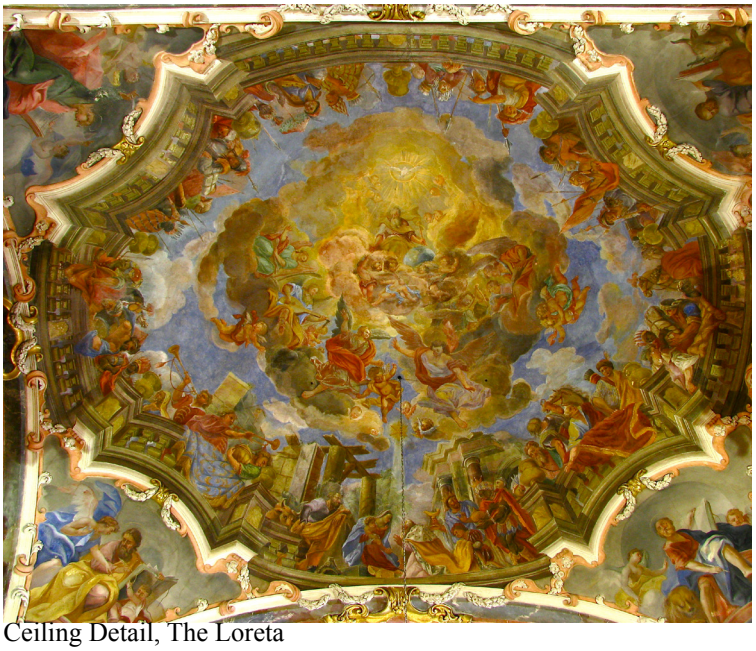
The Assumption, Dome of Sant'Agnese in Agone, Rome, Italy

Hall of Mirrors Detail, Palace of Versailles France

Apotheosis of S. Ignatius, Ceiling of Sant'Ignazio, Rome, Italy

Paint Illustrations

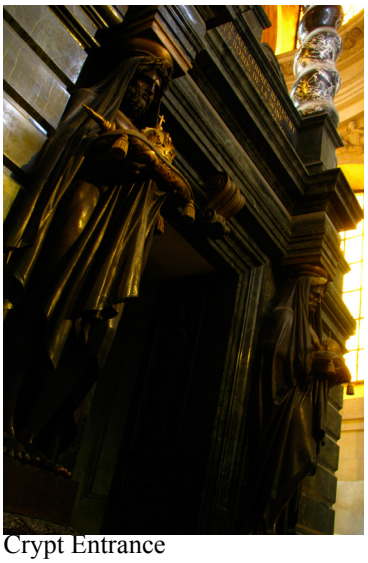
The Glory of the Blessed, Dome of Church of the Val-de-Grâce, Paris, France



Ceiling Detail, The Loreta
Prague, Czech Republic

Ceiling Detail, St. Nicolas Cathedral
Prague, Czech Republic

Marble Illustrations



Crypt Entrance
L'Hôtel National des Invalides
Paris, France

Solomonic Columns
L'Hôtel National des Invalides
Paris, France

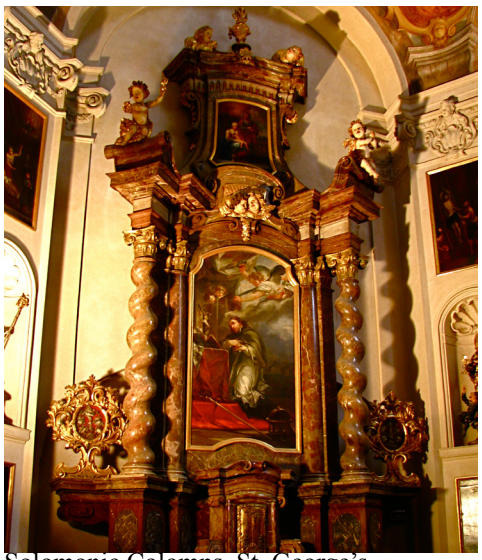
Pilaster Repetition
The Loreta
Prague, Czech Republic

Corinthian Capital
Church of the Gesu
Rome, Italy

Altar Base Detail
San Carlo alle Quattro Fontane
Rome, Italy

St. Andrew
Sant'Andrea al Quirinale
Rome, Italy

Side Chapel Detail, S. Maria del Popolo
Rome, Italy



Solomonic Colomns, St. George's
Convent, Prague, Czech Republic

Marble Illustrations

Memorial Installation
San Giovanni dei Fiorentini
Rome, Italy

High Altar
Sant'Agnese in Agone
Rome, Italy

Side Chapel Detail
Sant'Agnese in Agone
Rome, Italy

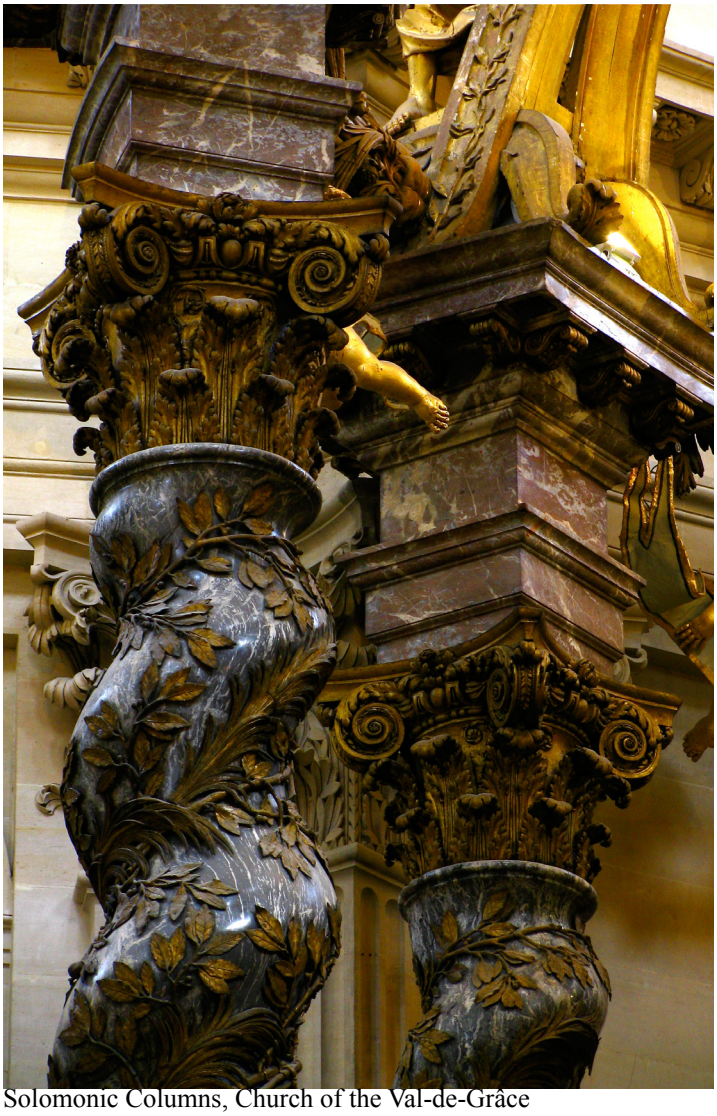
Ecstacy of St. Theresa, Santa Maria della Vittoria
Rome, Italy

Marble Illustrations

Solomonic Column
Sant'Ignazio
Rome, Italy

Side Chapel Sculpture
Santa Maria in Campitelli
Rome, Italy

Ornament Installation
St. Nicolas Cathedral
Prague, Czech Republic



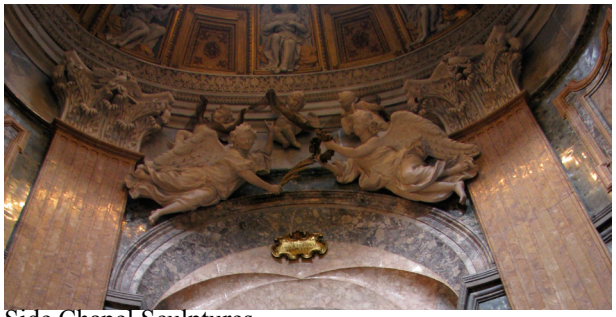
Solomonic Columns, Church of the Val-de-Grâce
Paris, France

Floor Inlay, Sant'Agnese in Agone
Rome, Italy

Marble Illustrations

Marble Inlay and Bust
Palace of Versailles
France

St. Andrew
Sant'Andrea al Quirinale
Rome, Italy

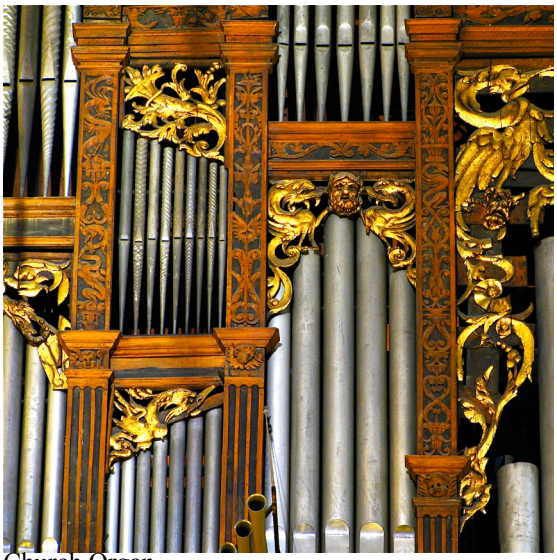


Side Chapel Sculptures
Sant'Agnese in Agone
Rome, Italy

High Altar, Sant'Ignazio
Rome, Italy

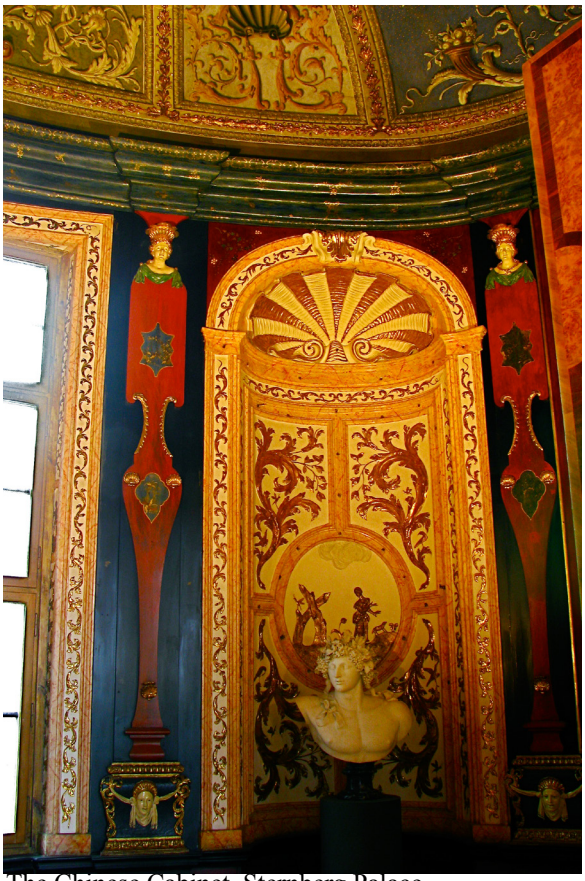
Sculpture Installation, St. Nicolas Cathedral, Prague, Czech Republic

Wood Illustrations

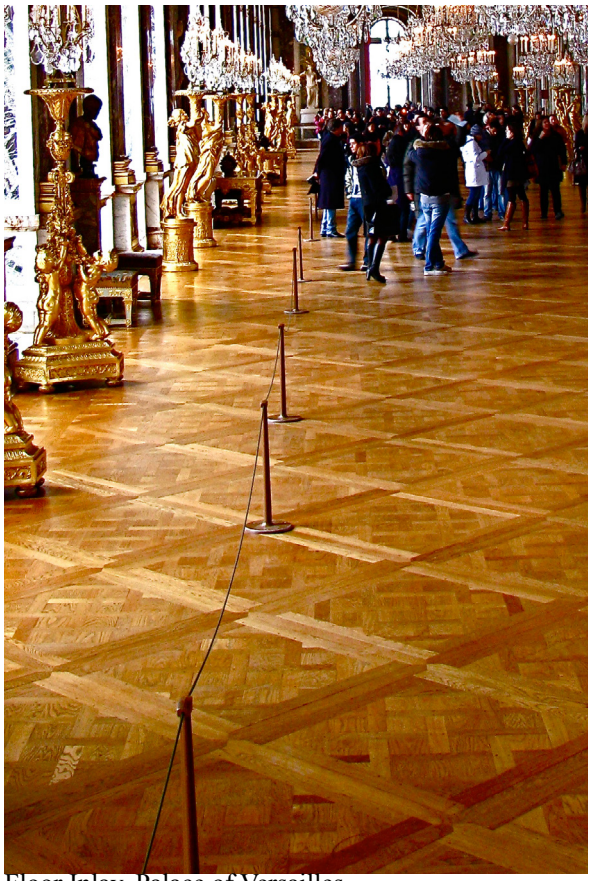


Church Organ
Cathedral of Bacelona
Barcelona, Spain

The Chinese Cabinet Floor Inlay
Sternberg Palace
Prague, Czech Republic



The Chinese Cabinet, Sternberg Palace
Prague, Czech Republic



Floor Inlay, Palace of Versailles
France

Wood Illustrations

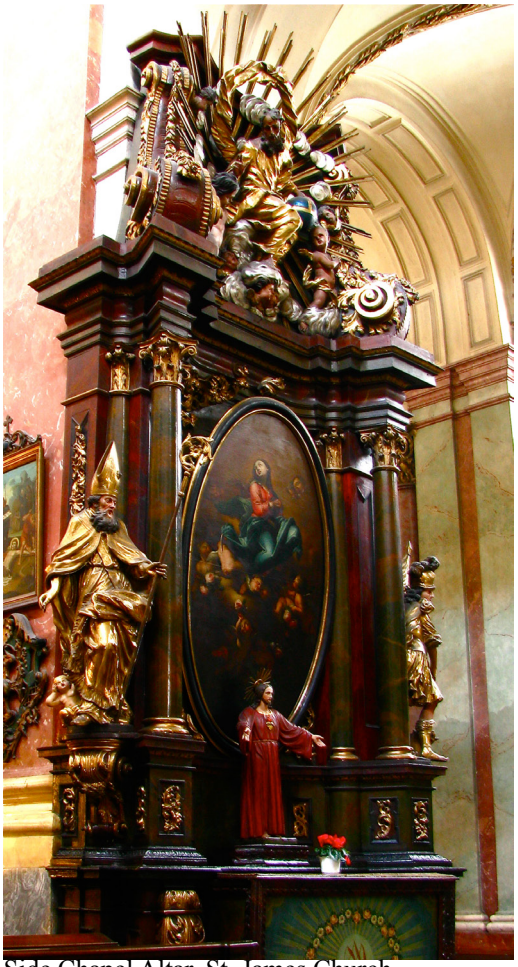
Side Chapel Altar
St. Nicolas Cathedral,
Prague, Czech Republic

Side Chapel Altar
St. Nicolas Cathedral,
Prague, Czech Republic

Side Chapel Altar
St. Nicolas Cathedral,
Prague, Czech Republic

Cloister Chapels
Loreta, Prague,
Czech Republic

Strahov Library
Prague, Czech Republic



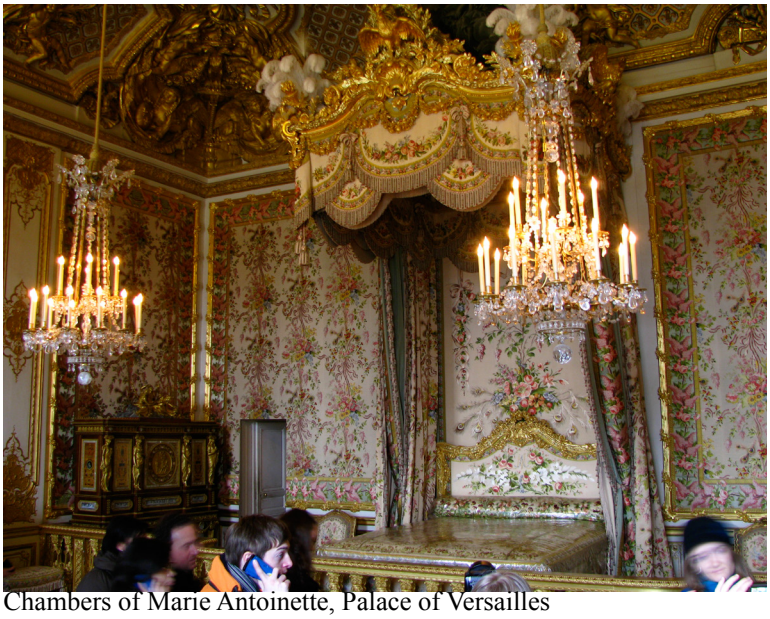
Side Chapel Altar, St. James Church
Prague, Czech Republic

Fabric/Tapestry Illustrations

Royal Palace, Palais du Louvre
Paris, France

King's Chambers, Palace of Versailles
France

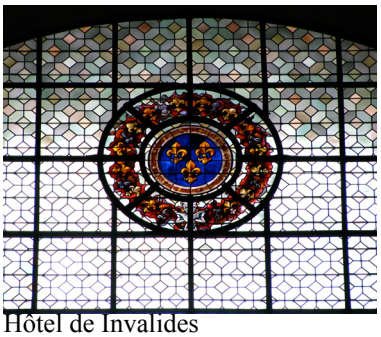
Hôtel de Soubise
Paris, France



Chambers of Marie Antoinette, Palace of Versailles
France

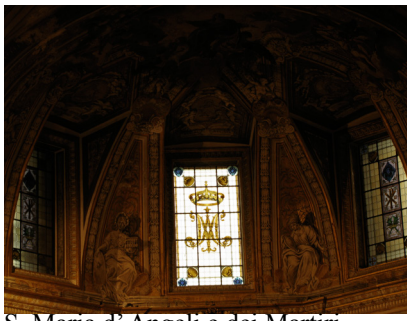
Palace of Versailles
France

Glass Illustrations

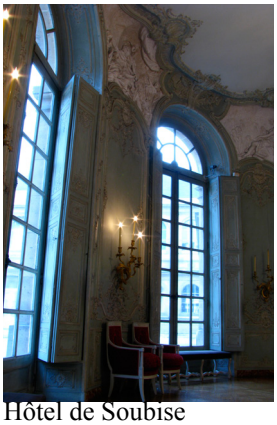


Hôtel de Invalides
Paris, France

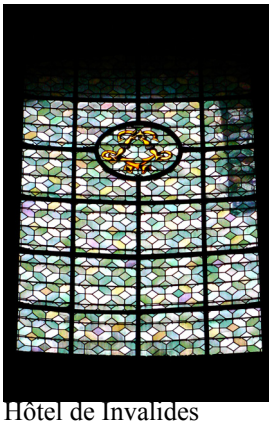
Hôtel de Soubise
Paris, France



S. Maria d' Angeli e dei Martiri
Rome, Italy



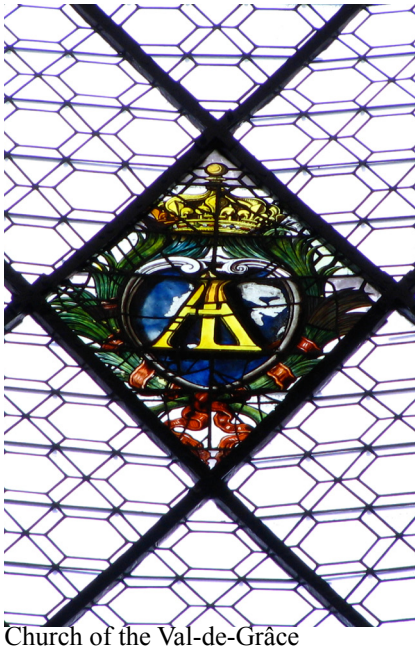
Hôtel de Soubise
Paris, France



Hôtel de Invalides
Paris, France

Sant'Agnese in Agone
Rome, Italy

Hall of Mirrors, Palace of Versailles
France



Church of the Val-de-Grâce
Paris, France

Plaster/Stucco Illustrations

Hôtel de Soubise
Paris, France

Strahov Library
Prague, Czech Republic

Sternberg Palace
Prague, Czech Republic

Strahov Library
Prague, Czech Republic

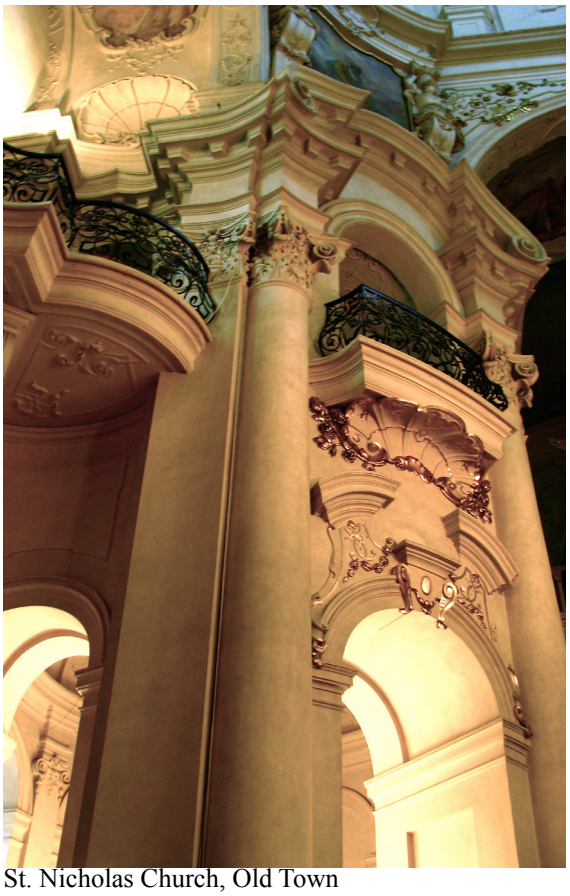
San Carlo alle Quattro Fontane
Rome, Italy

Plaster/Stucco Illustrations

Cathedral of Puebla
Puebla, Mexico

Santa María Tonantzintla
Puebla, Mexico

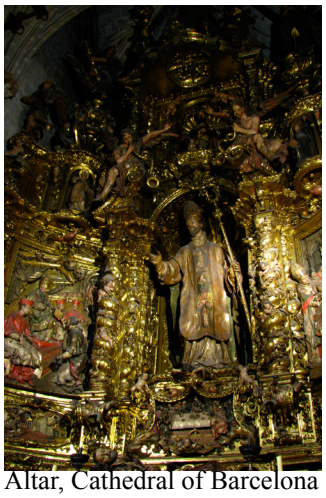
Hôtel de Soubise
Paris, France



St. Nicholas Church, Old Town
Prague, Czech Republic

Gilded Illustrations

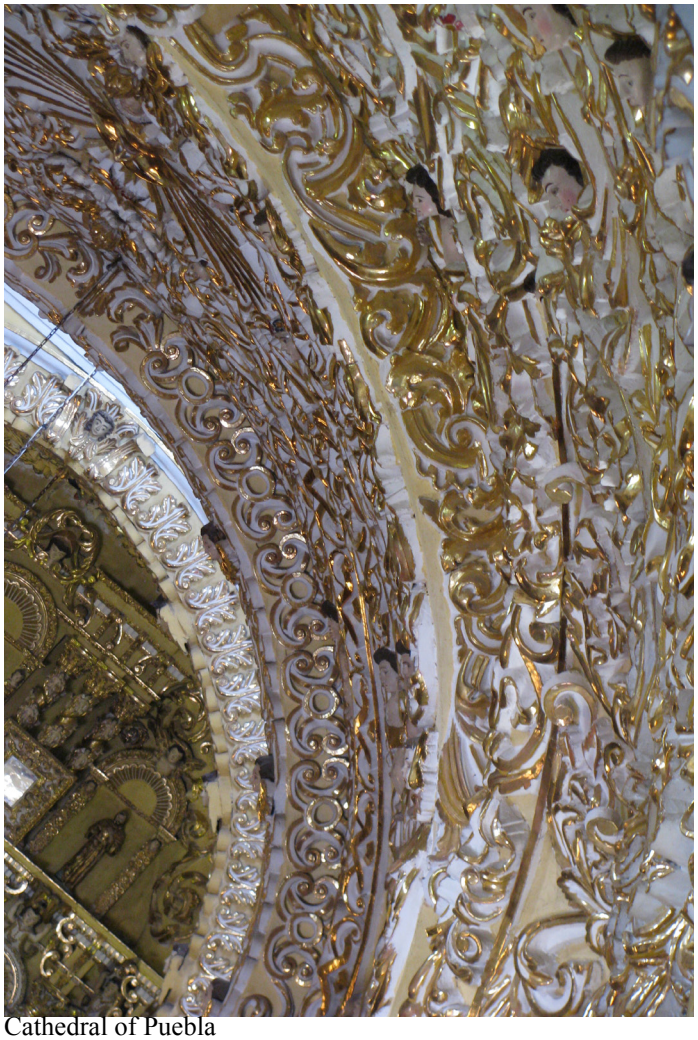
Altar, Cathedral of Barcelona
Barcelona Spain



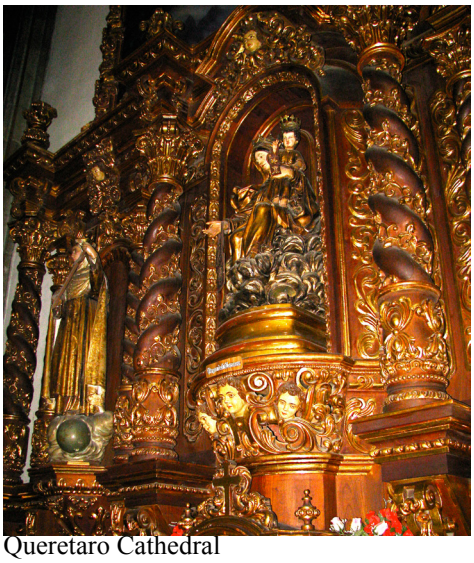
Altar, Cathedral of Barcelona
Barcelona Spain

Chiesa Nuova
Rome, Italy

Il Gesu
Rome, Italy



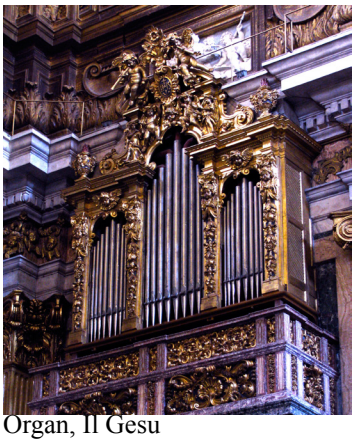
Cathedral of Puebla
Puebla, Mexico



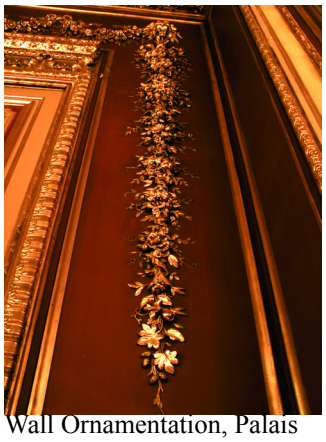
Queretaro Cathedral
Queretaro, Mexico

Gilded Illustrations

S. Maria d' Angeli e dei Martiri
Rome, Italy



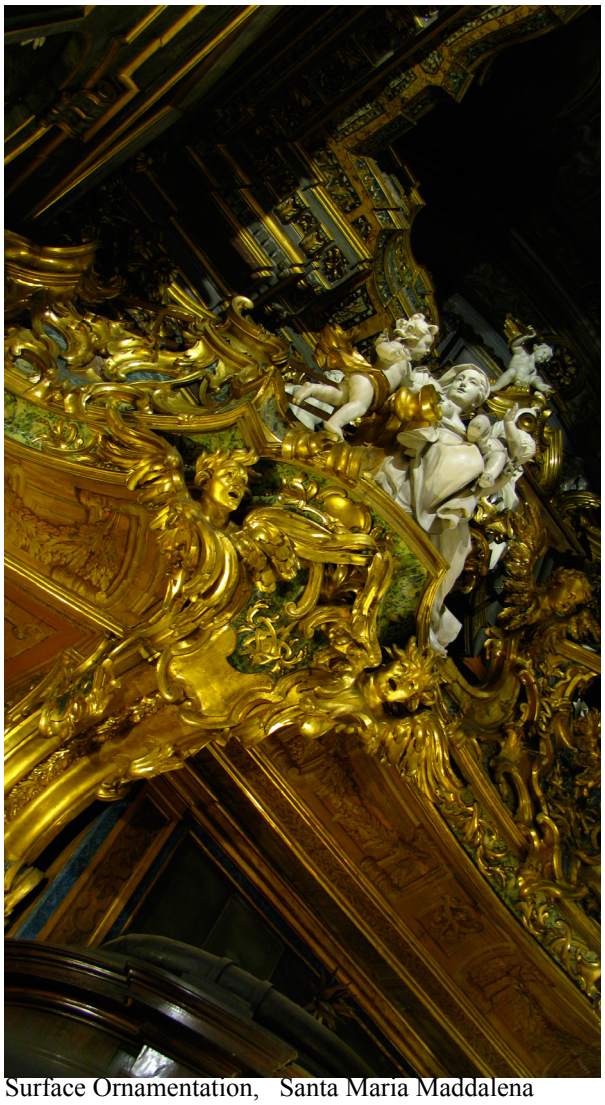
Organ, Il Gesu
Rome, Italy



Wall Ornamentation, Palais du Louvre Paris, France

Lantern Detail, Sant'Agnese in Agone
Rome, Italy

High Alter Sunburst, Santa Maria in Campitelli
Rome, Italy



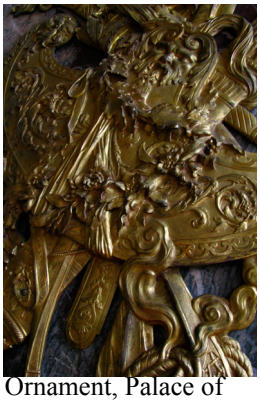
Surface Ornamentation, Santa Maria Maddalena
Rome, Italy

Gilded Illustrations

Pilaster Detail, Palace of Versailles France

Ceiling Ornamentation, Palace of Versailles, France

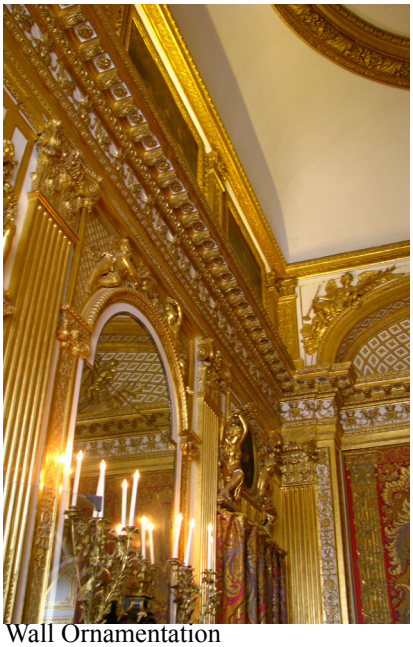
Entablature Detail, Palace of Versailles, France



Ornament, Palace of Versailles, France

Sant'Agnese in Agone Rome, Italy

High Altar Sunburst, Il Gesu Rome, Italy

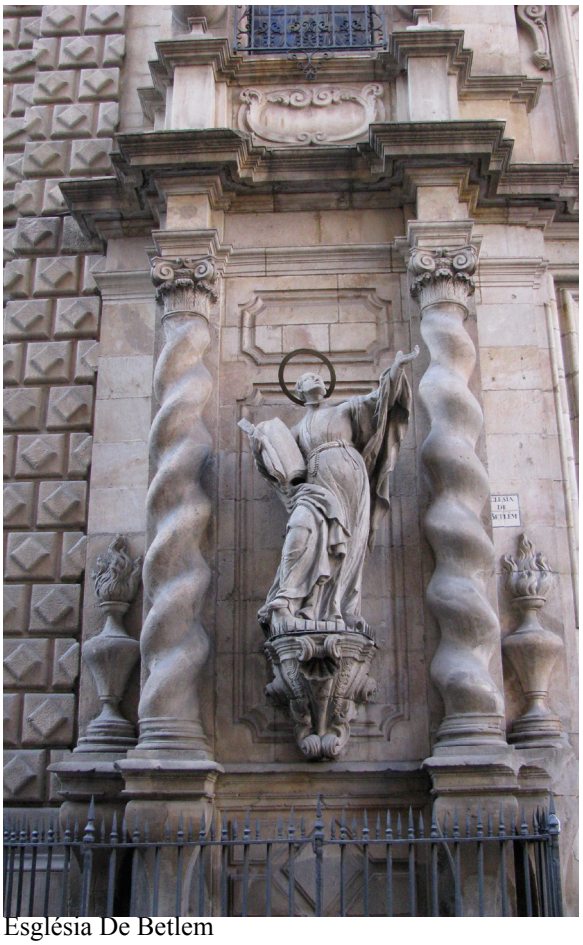


Wall Ornamentation Palace of Versailles, France

Pulpit Ornatmentation and Sunburst, St. Nicolas Cathedral, Prague, Czech Republic

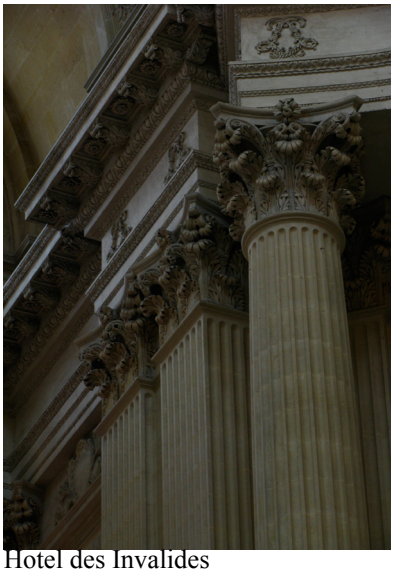
Coarse Stone Illustrations

Església De Betlem
Barcelona, Spain

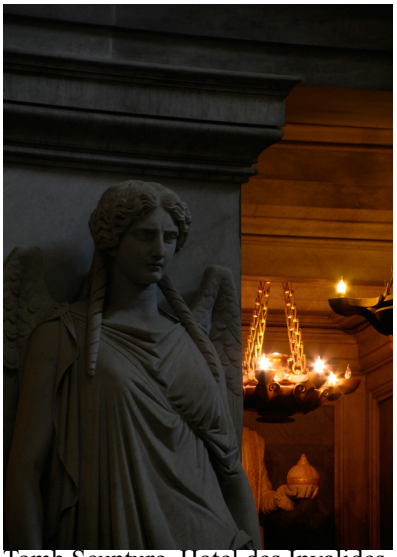


Església De Betlem
Barcelona, Spain

Hotel des Invalides
Paris, France



Hotel des Invalides
Paris, France



Tomb Scupture, Hotel des Invalides
Paris, France

Coarse Stone Illustrations

Santa Maria dell'Orazione e
Morte, Rome, Italy

Val-de-Grace
Paris, France

Val-de-Grace
Paris, France

Palace of Versailles
France

Val-de-Grace
Paris, France

Coarse Stone Illustrations

St. James Church
Prague, Czech Republic

Sant'Ivo alla Sapienza
Rome, Italy

Santa Maria in Campitelli
Rome, Italy

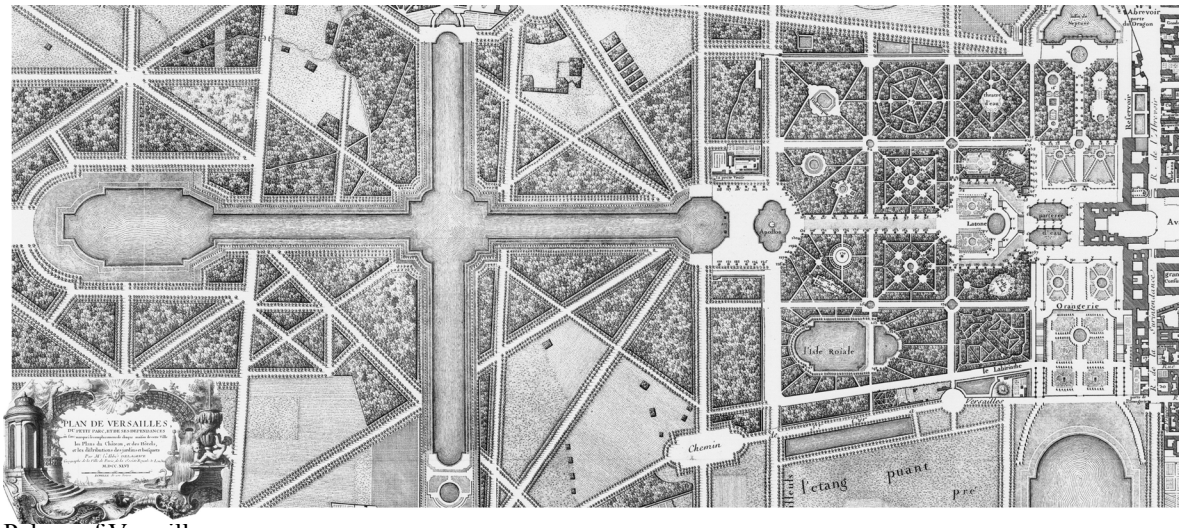
Santa Maria dell'Orazione e
Morte, Rome, Italy

Hôtel de Soubise
Paris, France

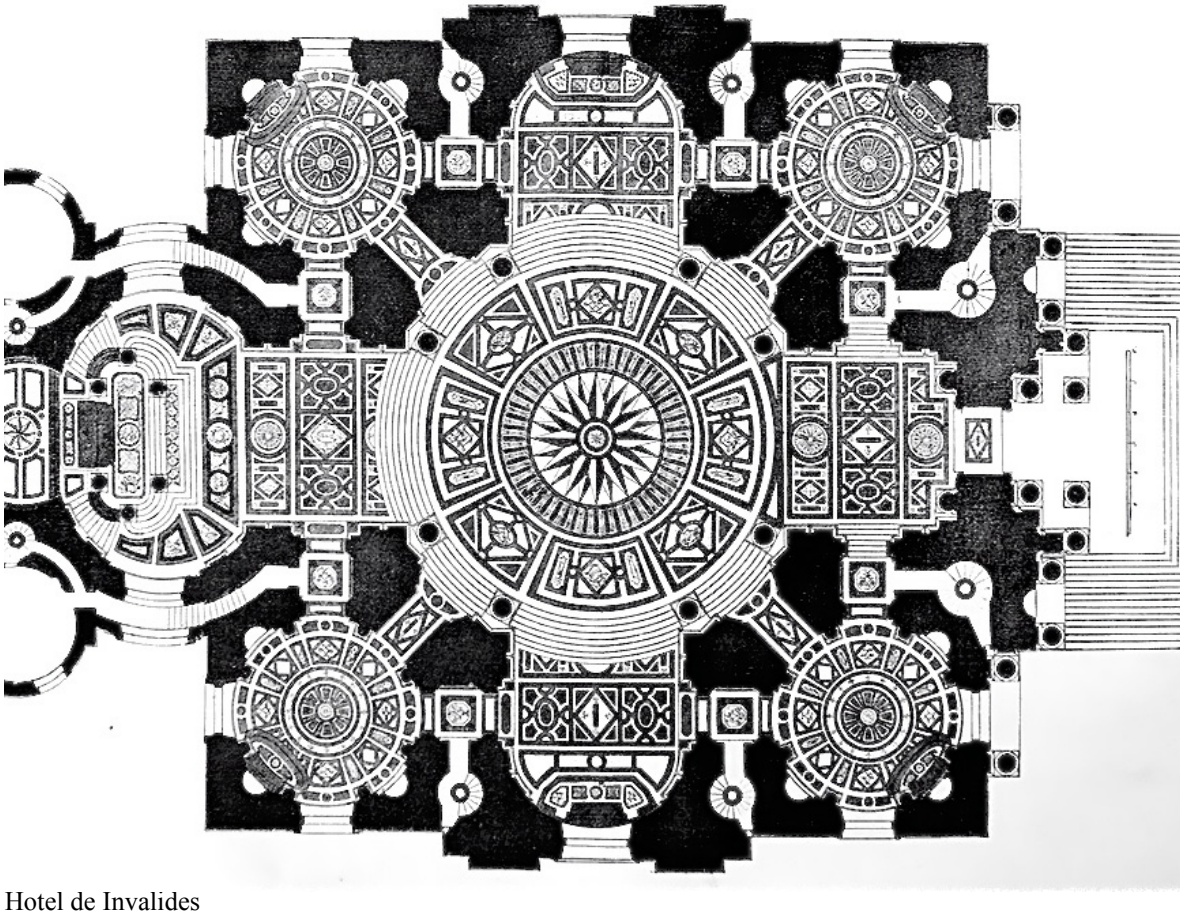
Sant'Agnese in Agone
Rome, Italy

APPENDIX C

Plans

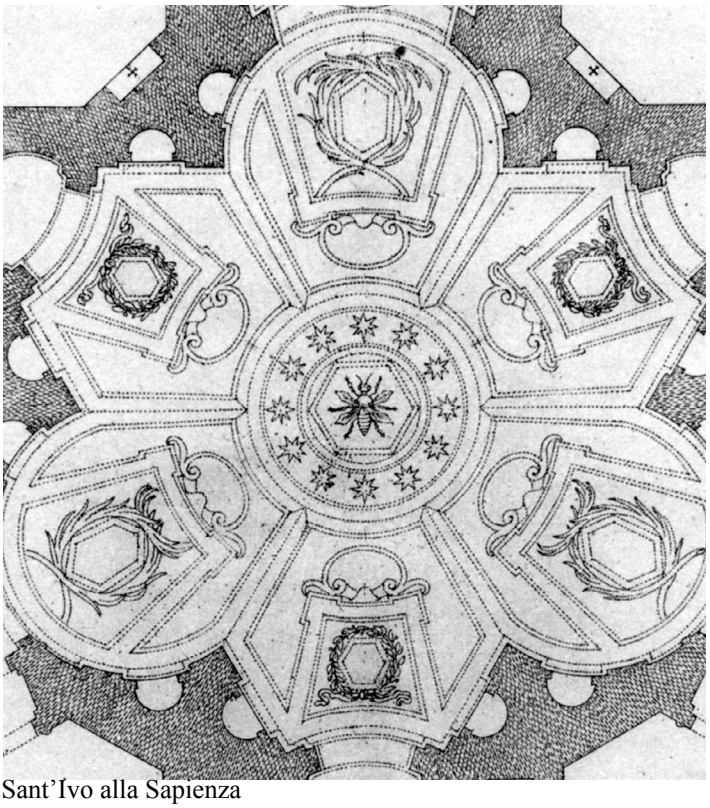


Palace of Versailles,
Paris, France

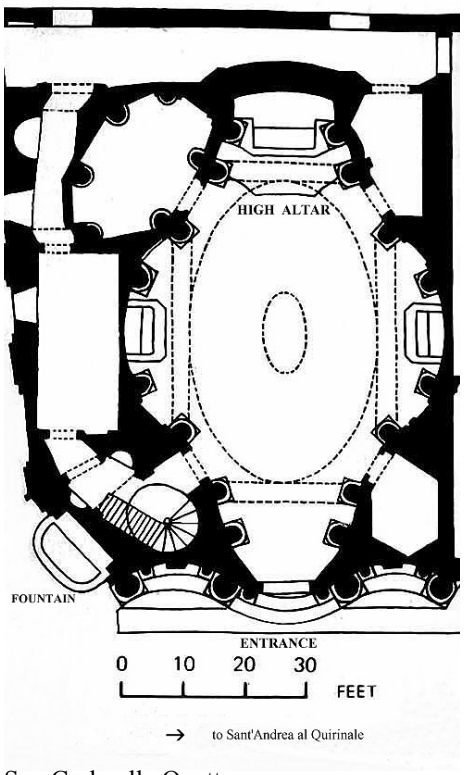


Hotel de Invalides
Paris, France

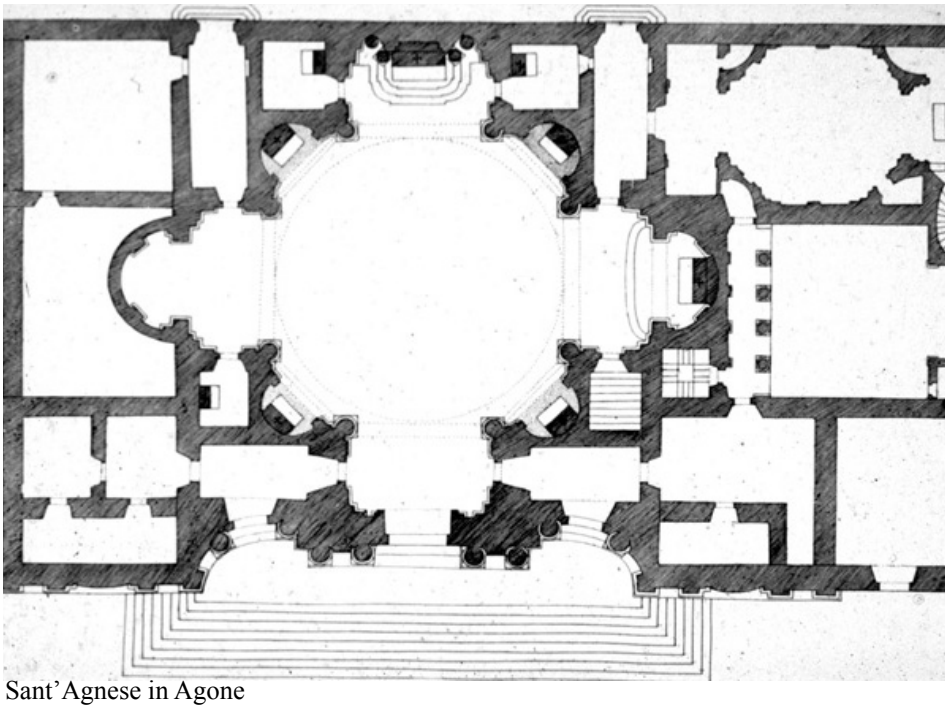
Plans



Sant'Ivo alla Sapienza
Rome, Italy

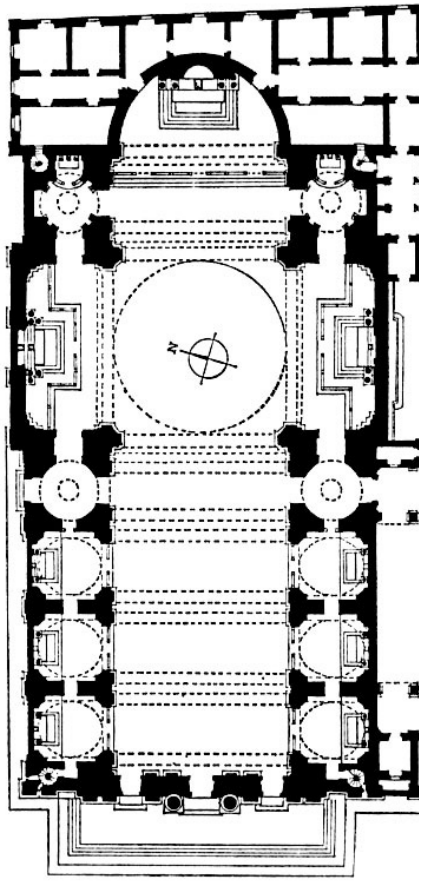


San Carlo alle Quattro
Rome, Italy

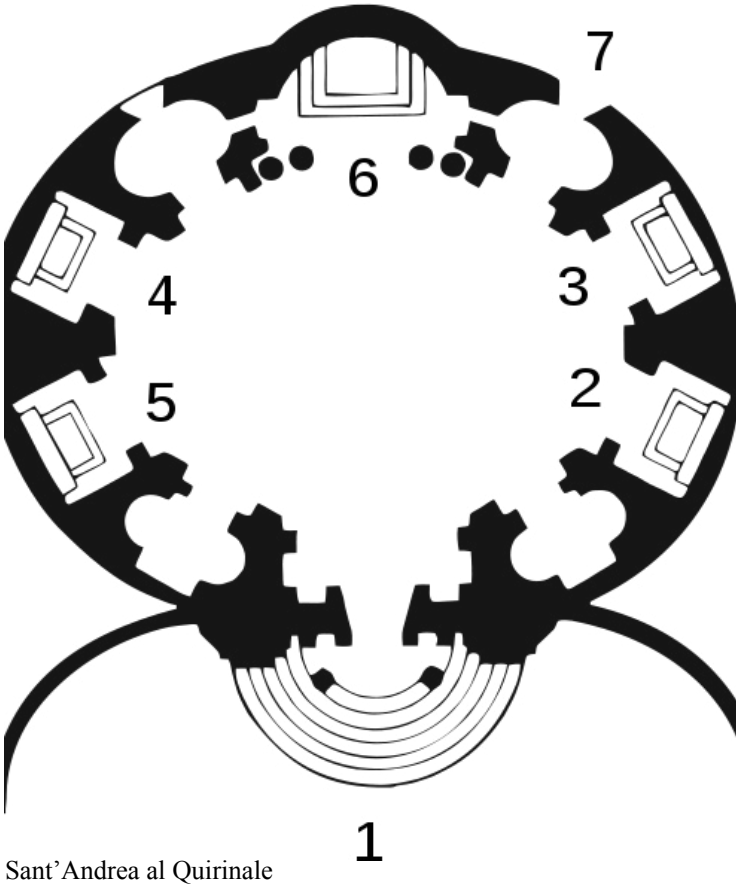


Sant'Agnese in Agone
Rome, Italy

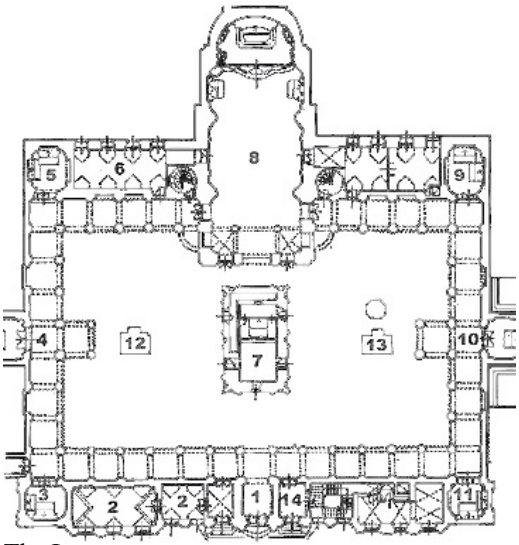
Plans



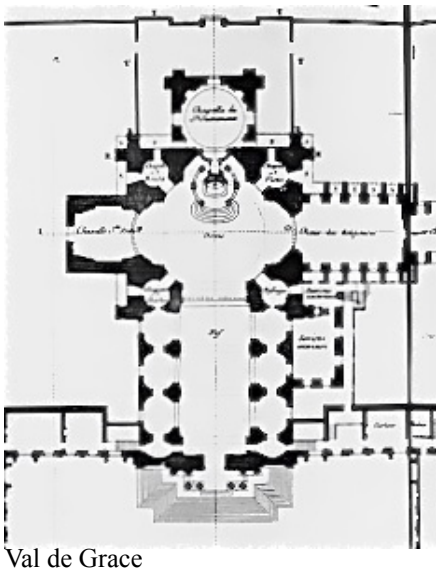
Il Gesu
Rome, Italy



Sant'Andrea al Quirinale
Rome, Italy



The Loreta
Prague, Czech Republic



Val de Grace
Paris, France

APPENDIX D

Surfaces (Smooth)

Marble Flooring, Val se Grace
Paris, France

Wood Inlay, Sternberg Palace
Prague, Czech Republic

Marble Altar, San Carlo alle Quattro Fontane
Rome, Italy

Marble Sculpture, Santa Maria della Vittoria
Rome, Italy

Plaster Interior St. Nicholas Church, Old Town
Prague, Czech Republic

Wooden Chapel Altar, St. Nicolas Cathedral,
Prague, Czech Republic

Surfaces (Coarse)

Travertine Pediment Support, Santa Maria dell'Orazione e Morte, Rome, Italy

Spiraling Stone Cupola, Sant'Ivo alla Sapienza Rome, Italy

Stone Facade, Cathedral Basilica of Puebla de Los Angeles, Puebla, Mexico

Stone Courtyard, Hôtel de Soubise Paris, France

Surfaces (Organic)

Column Gilding and Acanthus Leaf Capital
Church of the Val-de-Grâce, Paris, France

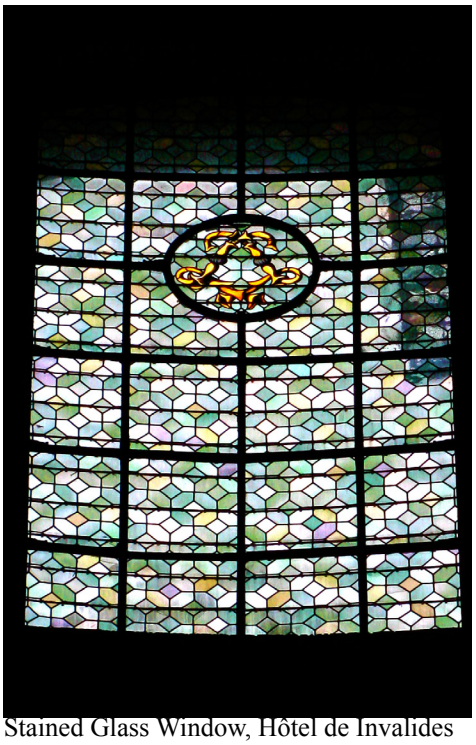
Floral Plaster Relief, Hôtel de Soubise
Paris, France

Plaster Ornamentation, Strahov Library
Prague, Czech Republic

Altar Floral Relief, Cathedral of Barcelona
Barcelona Spain

Surfaces (Geometric)

Floral Plaster Relief, Hôtel de Soubise
Paris, France



Stained Glass Window, Hôtel de Invalides
Paris, France

Marble Inlay, Palace of Versailles
Paris, France

Pendentive Detail, Val-de-Grace
Paris, France

Surfaces (Combination)

Smooth and Organic
Marble Solomonic Column with Floral Ornamentation
Sant'Ignazio, Rome, Italy

Coarse and Organic
Stone Figural Relief, St. James Church
Prague, Czech Republic

Coarse and Geometric
Stone Facade, Hotel des Invalides
Paris, France

Smooth, Organic and Geometric
Memorial Installation, San Giovanni dei Fiorentini
Rome, Italy

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